

# PRINT BONDING APPARATUS, AUTOMATIC BOOKBINDING APPARATUS AND IMAGE FORMING APPARATUS

## Cross-Reference to Related Application

This application claims priority under 35 USC 119 from Japanese Patent Application Nos. 2003-119257, the disclosure of which is incorporated by reference herein.

## BACKGROUND OF THE INVENTION

### Field of the Invention

The present invention relates to a print bonding apparatus, an automatic bookbinding apparatus and an image forming apparatus and in particular, to a print bonding apparatus and an automatic bookbinding apparatus capable of bookbinding ondemand various photograph collections such as commemorative albums, and an image forming apparatus appropriately used for supplying photographic prints to the print bonding apparatus.

### Description of the Related Art

In recent years, in photograph laboratories, the printing of not only negative images formed on a negative film but also images taken by a digital camera has been widely performed. Further, there has been an increasing demand for producing photograph collections directly from prints produced in this manner.

In recent years, an automatic bookbinding systems in which electrophotography-type copiers or printers are combined with bookbinding machines have been used for on-demand bookbinding (Japanese Patent Application Laid-Open (JP-A) Nos. 2001-334771 and 2002-46932).

In the type of automatic bookbinding system described above, images are formed on sheets of paper by the copier or the printer, glue is applied to the sheets of paper having images formed thereon and the sheets of papers are bound by a bookbinding machine.

However, in order to produce a photograph collection by means of the above-described bookbinding system, an original print produced by printing images on the photographic paper has had to be copied onto predetermined paper using a copier linked to the bookbinding system.

Moreover, an electrophotography-type copier or printer is not only has lower sensitivity than silver salt photographs but is also inferior in terms of brightness of color and reproduction of color, and in terms of fineness of quality. Hence, images produced by copying the type of print described above by the means of an electrophotography-type copier are inevitably inferior to the original image in terms of quality.

Accordingly, a problem arises that, when attempts have been made to produce photograph collections by means of the bookbinding system described above, a great deal of time and labor was required to produce the photograph collections and satisfactory image quality could not be achieved.

For these reasons, in the related art, it is at present practically impossible to produce a photograph collection of excellent image quality by means of on-demand bookbinding.

## SUMMARY OF THE INVENTION

The present invention has been made to solve the above problem, and to provide a print bonding apparatus and an automatic bookbinding apparatus capable of producing a photograph collection easily, by on-demand bookbinding, from prints

produced by printing images on photographic paper, and to provide an image forming apparatus which can be appropriately used with the automatic bookbinding apparatus.

In order to achieve the above object, a first aspect of the invention is to provide a print bonding apparatus including: a distributing device that sequentially distributes photographic prints delivered by an image forming apparatus; and a bonding device that bonds together bottom surfaces of two photographic prints distributed by the distributing device in a condition in which the bottom surfaces are opposed to each other and in which the edges of the two photographic prints are aligned with each other.

In the print bonding apparatus, photographic prints produced by the image forming apparatus are distributed in sequence and are automatically bonded together with bottom surfaces of the photographic prints opposed to each other, thus being formed into double-sided photographic sheets.

The double-sided photographic sheets thus produced can be bound by bookbinding, and formed into a photograph collection by means of an automatic bookbinding apparatus which will be described later.

Moreover, the double-sided photographic sheets need not necessarily be book-bound but can also be utilized as various kinds of cards, postcards or name cards. In these circumstances, the double-sided photographic sheets can be utilized in a state in which, for example, letters or pictures are printed on one print side thereof.

In the image forming apparatus described above, a negative image formed on a negative film can be directly printed on the photographic paper. However, it is desirable that the negative image is read by a scanner and digitalized to form image data, and that on the basis of this image data the photographic paper is scanned by laser lights of the three colors of red, green, and blue in a direction orthogonal to a transfer direction, thus exposing the photographic paper to laser lights.

Further, image data capable of being used for exposure in an exposure section include not only data obtained by digitalizing negative images but also image data acquired by means of a scanner reading various kinds of printed materials, image data acquired by taking images with a digital camera, and image data sent through the Internet.

A second aspect of the invention is to provide a bonding device including: a print transfer unit that transfers two distributed photographic prints with the bottom surfaces of the two photographic prints opposed to each other; a glue applying unit that applies glue to the bottom surface of at least one of the two photographic prints transferred by the print transfer unit; a bonding unit that makes end edges of the two photographic prints respectively transferred by the print transfer unit abut against each other, and bonds them together; and a side edge aligning unit that before the two photographic prints are bonded together aligns the side edges of the two photographic prints which have been made to abut against each other by the bonding unit.

In the print bonding apparatus of this aspect, the photographic prints delivered by the image forming apparatus are distributed by the distributing device in sequence and are held in the print transfer unit and transferred, with the back surfaces of the photographic opposed to each other. Then, glue is applied or a double-sided glue tape is applied by the glue applying unit to the bottom surface of one or both of the two photographic prints. Then, the end edges of the two photographic prints are made to abut against each other in the bonding unit, in a condition in which the side edges of the two photographic print are aligned with each other by the side edge aligning unit. The two photographic prints are then bonded together, and, with this process, a double-sided photographic sheet is formed.

Hence, according to the print bonding apparatus of this aspect, one continuous

integrated process is carried out, beginning with the process of producing the photographic prints by means of the image forming apparatus, and ending with the process of bonding together two photographic prints to produce double-sided photographic sheets. Moreover, this integrated process can produce double-sided photographic sheets whose end edges and side edges are aligned with each other. In this context, an end edge represents an end edge on the downstream side of the edges orthogonal to a direction in which the photographic paper has been delivered by the image forming apparatus, and a side edge means an edge in a direction orthogonal to an end edge.

A third aspect of the invention is to provide a print bonding apparatus, wherein the distributing device distributes the photographic prints in left and right directions orthogonal to a direction in which the photographic prints have been delivered by the image forming apparatus; the print transfer unit is vertical transfer belts for transferring the two photographic prints distributed by the distributing device in a condition in which the two photographic prints are in a vertical state and in which the bottom surfaces of the photographic prints are opposed to each other; and the bonding unit is bonding rollers that make the end edges of the two photographic prints, which have been transferred by the vertical transfer belt, abut against each other, sandwich the two photographic prints and transfer the two photographic prints to bond them together.

In the print bonding apparatus of this aspect, the photographic prints delivered by the image forming apparatus are distributed by the distributing device in left and right directions, and the photographic prints distributed in left and right directions are transferred by the vertical transfer belt in a vertical state in which the back surfaces of the photographic prints are opposed to each other. Then, the end edges of the photographic prints are made to abut against each other in the bonding rollers and are

aligned with each other. The photographic prints are then bonded together with glue.

In short, the print bonding apparatus of this aspect can handle photographic prints with ease and in consequence breakdowns rarely occur.

A fourth aspect of the invention is to provide an automatic bookbinding apparatus including: the print bonding apparatus according to the first to third aspects; a photographic print stacking portion that stacks double-sided photographic prints produced by the print bonding apparatus by means of bonding together the photographic prints in a condition in which one side of each of the photographic prints is aligned with one side of another photographic print; a side aligning unit that aligns three sides of a stack of double-sided photographic prints stacked by the photographic print stacking portion; and a belt mounting unit that binds the backs of the stack of double-sided photographic prints whose three sides have been aligned by the side aligning unit.

In the automatic bookbinding apparatus of this aspect, the double-sided photographic prints produced by the print bonding apparatus as a result of bonding the photographic prints are stacked in the photographic print stacking portion in a condition in which one side of each photographic print is aligned with one side of another photographic print. Then, the three sides of the stack of double-sided photographic prints are aligned with one another by the side aligning unit.

The side aligning unit includes not only a side aligning device that regularly makes a mechanical impact on the stack of double-sided photographic prints, and aligns both the end edges and the side edges of the double-sided photographic prints constituting the stack, but also a cutting unit that cuts the ear portions of the three sides to align the end edges and the side edges.

According to the automatic bookbinding apparatus of this aspect, an integrated process is performed, which process includes first forming photographic prints by

exposing, developing, drying and cutting the photographic paper, bonding the photographic prints together to form the double-sided sheets, stacking the double-sided sheets and bookbinding the double-sided sheets to produce a photograph collection. Accordingly, a photograph collection of excellent image quality can easily be produced by on-demand bookbinding.

In the side aligning unit, three or four sides of the stack of double-sided sheets are cut in sequence by a machine shaped like a cutter, and the stack of double-sided sheets can thus be rearranged into either a rectangular or a square shape. Moreover, in order to modify the shape of the stack of double-sided sheets it is also recommended that the three sides of the stack be cut at the same time by a cutting machine, which is provided with a plate-shaped upper edge having a rectangular or square opening in the center and a lower edge formed in a shape enabling the lower edge to fit exactly into the opening.

For the belt mounting unit, any method can be employed, provided that the method is a back-binding method of the type normally used in bookbinding. Specifically, the belt mounting unit mounts a belt on the backs of a stack of double-sided sheets, whose remaining sides have been aligned by the side aligning unit, and then binds the backs.

A fifth aspect of the invention is to provide an image forming apparatus for delivering photographic prints to the distributing device of the print bonding apparatus according to any one of the first to third aspects or to the distributing device of the print bonding apparatus provided in the automatic bookbinding apparatus according to the fourth aspect, wherein a temperature of a drying process portion for drying the photographic prints after they have been washed with water is controlled, on the basis of a type and size of photosensitive material, and of an ambient environment, at one at

which the photographic print does not curl.

When a large warp shaped like a water pipe develops in a print, cases occur where the bonding of prints by a print bonding apparatus becomes difficult. However, in the above-described print bonding apparatus, prints bonded together each very rarely have a large warp shaped like a water pipe, and difficulties that could jeopardize bonding of prints by the print bonding apparatus simply do not arise.

Here, the phrase “very rarely have such a large warp shaped like a water pipe” means that, in the print bonding apparatus described above, warps large enough as to interfere with the bonding of pairs of prints do not occur, but this does not rule out cases in which a modest amount of warp is caused in a print.

The phrase “ambient environment” used above embraces, for example, both an ambient temperature and an ambient humidity.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side view showing the general construction of an automatic bookbinding system in accordance with one embodiment of the present invention.

Fig. 2 is a plan view showing the general construction of the automatic bookbinding apparatus in accordance with the embodiment.

Fig. 3 is a front view showing the general construction of the bookbinding section of the automatic bookbinding apparatus in accordance with the embodiment.

Fig. 4 is a plan view showing the operating procedure of the print bonding section when a first print is introduced into the print bonding section provided in the automatic bookbinding apparatus in accordance with the embodiment.

Fig. 5 is a plan view showing the operating procedure of the print bonding section when a first print is introduced into the print bonding section provided in the



automatic bookbinding apparatus in accordance with the embodiment.

Fig. 6 is a plan view showing the operating procedure of the print bonding section when a first print is introduced into the print bonding section provided in the automatic bookbinding apparatus in accordance with the embodiment.

Fig. 7 is a plan view showing the operating procedure of the print bonding section when a first print is introduced into the print bonding section provided in the automatic bookbinding apparatus in accordance with the embodiment.

Fig. 8 is a plan view showing the operating procedure of the print bonding section when a second print is introduced into the print bonding section provided in the automatic bookbinding apparatus in accordance with the embodiment.

Fig. 9 is a plan view showing the operating procedure of the print bonding section when a second print is introduced into the print bonding section provided in the automatic bookbinding apparatus in accordance with the embodiment.

Fig. 10 is a plan view showing the operating procedure of the print bonding section when a second print is introduced into the print bonding section provided in the automatic bookbinding apparatus in accordance with the embodiment.

Fig. 11 is a plan view showing a first print and a second print being put into bonding rollers in a condition in which they abut against each other in the print bonding section provided in the automatic bookbinding apparatus in accordance with the embodiment.

Fig. 12 is a plan view showing a first print and a second print being bonded together by the bonding rollers to form a double-sided sheet and the double-sided sheet being delivered to a stacking platform in the print bonding section provided in the automatic bookbinding apparatus in accordance with the embodiment.

Fig. 13 is a front view showing an operating procedure of a bookbinding

section when a stack of double-sided sheets stacked on the stacking platform are being introduced into the bookbinding section in the automatic bookbinding apparatus.

Fig. 14 is a front view showing a stack of double-sided sheets stacked on the stacking platform being cut by a cutting section in the bookbinding section and the three end surfaces of the double-sided sheets being rearranged.

Fig. 15 is a front view showing a stack of double-sided sheets, which have been cut and rearranged into shape by the cutting section, being transferred to a belt mounting section.

Fig. 16 is a front view in the belt mounting section showing a photograph collection, which has been produced by bonding a belt to the back of a stack of double-sided sheets, and is being stacked in the book-stacking section of the bookbinding section.

## DETAILED DESCRIPTION OF THE INVENTION

A general construction of an automatic bookbinding system 100 is shown in Figs. 1 to 3, which system is one example of a combination of an automatic bookbinding apparatus and an image forming apparatus in accordance with one embodiment of the present invention.

As shown in Figs. 1 to 3, an automatic bookbinding system 100 in accordance with the present embodiment is provided with: an image forming apparatus 2 that produces sheets of photographic prints, each print having an image formed on one of its surfaces, and that sends the photographic prints with the image surfaces of the photographic prints facing upwards; a print bonding section 4 that bonds the photographic prints formed by the image forming apparatus 2 and stacks them; and a bookbinding section 6 that binds the photographic prints bonded and stacked by the

print bonding section 4. The print bonding section 4 and the bookbinding section 6 constitute an automatic bookbinding apparatus 3. The print bonding section 4 in the automatic bookbinding apparatus 3 corresponds to the print bonding apparatus of the automatic bookbinding apparatus according to the invention. The bookbinding section 6 in the automatic bookbinding apparatus 3 corresponds to the photographic print stacking portion, the side aligning unit and the belt mounting unit of the automatic bookbinding apparatus according to the invention.

The image forming apparatus 2, as shown in Fig. 1, includes magazine mounting sections 22A and 22B that are respectively mounted with magazines Ma and Mb, each receiving photographic paper P which has been rolled into the shape of a roll; an exposure section 24 that exposes to light the photographic paper P which has been unrolled from the magazines Ma and Mb and transferred in a direction of arrow (a), a developing section 26 that develops the photographic paper P exposed by the exposure section 24; and a drying and cutting section 28 that dries the photographic paper P developed by the developing section 26 and cuts it for each image.

In the exposure section 24, on the basis of digital image data inputted from the image processing unit (not shown) the photographic paper P is scanned in a direction orthogonal to a transfer direction (a) with three color laser lights, red, green, and blue, whereby a latent image is formed on the photographic paper P. Digital image data capable of being inputted to the exposure part 24 includes not only image data acquired by digitalizing negative images, but also image data acquired by reading with a scanner various kinds of printed materials, image data acquired by using a digital camera, and image data sent through the Internet.

The developing section 26 has a developing tank 26A for coloring and developing the photographic paper P exposed by the exposure section 24; a bleaching

and fixing tank 26B for bleaching and fixing the photographic paper P colored and developed in the developing tank 26A, and a washing tank 26C for washing with water the photographic paper P bleached and fixed in the bleaching and fixing tank 26B.

The drying and cutting section 28 has a drying heater 28A for drying the photographic paper P washed with water in the washing tank 26C of the developing section 26, and a cutting machine 28B that cuts, for each image, the photographic paper P dried in the drying heater 28A, into print sheets.

The photographic paper P is rolled with a photosensitive surface coated with a photosensitive emulsion facing outwards and is received in each of the magazines Ma and Mb.

The photographic paper P unrolled from magazine Ma or Mb, as shown in Fig. 1, is transferred to the exposure section 24 with the photosensitive surface facing outwards.

In the exposure section 24, the photosensitive surface of the photographic paper P is scanned with laser lights, whereby latent images are formed on the photosensitive surface of the photographic paper P.

Within the developing section 26, in the developing tank 26A, the bleaching and fixing tank 26B, and the washing tank 26C the photographic paper P is transferred with the photosensitive surface facing inside. In the drying and cutting section 28, the photographic paper P is transferred with the photosensitive surface of the photographic paper P facing the drying heater 28A, which is located below the transfer route of the photographic paper P. A temperature of the drying heater 28A is controlled, on the basis of a type and size of photosensitive material, and of environmental humidity, at a temperature at which the photographic paper P does not curl. Control of a drying temperature can be performed by controlling the duty ratio of current passing through

the drying heater 28A. The photographic paper P which has passed near the drying heater 28A is turned upwards and transferred to the cutting machine 28B. Hence, prints produced by the image forming apparatus 2 are transferred to the print bonding section 4 in a condition in which the images face upwards, as shown in Figs. 1 and 2.

The print bonding section 4, as shown in Figs. 1 to 3, is provided with a print distributing section 40 that distributes alternately prints produced by the image forming apparatus 2 along a direction orthogonal to a transfer direction (a) in the image forming apparatus 2 in a horizontal plane, as shown by arrow (b) in Fig. 2, bonding rollers 42 that bond the bottom surfaces of prints distributed by the print distributing section 40, which bottom surfaces are surfaces opposite to the surfaces on which images have been formed; a gluing and transfer section 44 that applies glue to the bottom surface of a first print distributed by the print distributing section 40 and transfers the print to the bonding rollers 42; a print transfer section 46 that transfers a second print distributed by the print distributing section 40 to the bonding rollers 42, and a stacking platform 48 that stacks double-sided sheets produced by the bonding together of the bottom surfaces of the prints by the bonding rollers 42. The print distributing section 40, the bonding rollers 42, the gluing and transfer section 44, and the stacking platform 48 respectively correspond to the distributing device, the bonding unit and the glue applying unit provided in the print bonding apparatus of the invention, and to the photographic print stacking portion provided in the automatic bookbinding apparatus of the invention.

The print distributing section 40 is provided with a horizontal conveyor 40A that horizontally distributes prints produced by the image forming apparatus 2 in left and right directions, that is, in directions orthogonal to the transfer direction (a) of the photographic paper P, as shown by arrow (b) in Fig. 2; a pair of delivery rollers 40B that delivers in the direction of the horizontal conveyor 40A prints produced by the image

forming apparatus 2; a vertical conveyor 40C that delivers, to the gluing and transfer section 44, the prints distributed by the horizontal conveyor 40A in a direction left of the transfer direction (a), and a vertical conveyor 40D that delivers, to the print transfer section 46, prints distributed by the horizontal conveyor 40A in a direction right of the transfer direction (a).

The horizontal conveyor 40A is a belt conveyor arranged parallel to a direction shown by the arrow (b) with the surface of a belt for transferring the prints disposed horizontal. The horizontal conveyor 40A has a function of transferring prints alternately, and when one print is transferred in a direction to the right of the transfer direction (a), the next print is transferred in a direction to the left of the transfer direction (a).

The delivery rollers 40B are a pair of rollers arranged along a horizontal direction parallel to the horizontal conveyor 40A, and the delivery rollers 40B have a function of putting on the horizontal conveyor 40A print sheets produced by the image forming apparatus 2.

Each of the vertical conveyors 40C and 40D is arranged with the surface of the belt for transferring the prints in a vertical state, and each is a vertical conveyor on which the prints are disposed to be held on the surface of the belt.

A guide roller 40E is provided at the end on the vertical conveyor 40C side of the horizontal conveyor 40A and guides the prints, which have been transferred on the horizontal conveyor 40A in the direction of the vertical conveyor 40C, as far as the vertical conveyor 40C. Similarly, a guide roller 40F is provided at the end on the vertical conveyor 40D side of the horizontal conveyor 40A and guides the prints, which have been transferred on the horizontal conveyor 40A in the direction of the vertical conveyor 40D, as far as the vertical conveyor 40D.

The gluing and transfer section 44 is provided with a gluing roller 44A that is arranged in a vertical direction, and applies glue to the bottom surfaces of the prints; a press and transfer roller 44B that presses the print against the gluing roller 44A and, in cooperation with the gluing roller 44A, transfers the prints in the direction of the bonding rollers 42; and a guide plate 44C, interposed between the press and transfer roller 44B and the bonding rollers 42, that guides the prints to the bonding rollers 42.

Under the guide plate 44C a side edge aligning plate 41 is provided that aligns the side edges of photographic prints transferred by the print transfer section 46 with the side edges of the photographic prints transferred by the gluing transfer section 44. The side edge aligning plate 41 corresponds to the side edge aligning unit in the print bonding apparatus of the invention.

The print transfer section 46 is provided with a main conveyor belt 46A that has a surface of the belt for transferring the prints, which belt surface being disposed vertical, and transfers the prints from the vertical conveyor 40D towards the bonding rollers 42, and with a sub-conveyor 46B arranged along the main conveyor 46A.

As shown in Figs. 1 to 3, the stacking platform 48, has a double-sided sheet receiving surface 48A that, when the double-sided sheets produced by the print bonding part 4 are stacked, receives the bottom sides of the double-sided sheets, and a double-sided sheet stacking surface 48B that likewise receives the image surfaces of the double-sided sheets. The stacking platform 48 has a cross section shaped like a letter J, or like an inverted letter L.

When the stacking platform 48 stacks the double-sided sheets produced by the print bonding section 4, as shown by an arrow c in Fig. 3, the stacking section 48 is held with the double-sided sheet receiving surface 48A becoming practically horizontal, and the double-sided sheet stacking surface 48B becoming practically vertical. When the

double-sided sheets stacked on the stacking surface 48A are bound by the bookbinding section 6, the stacking platform 48 is turned about 90° with its top edge as the center of the rotation, and held with the double-sided sheet stacking surface 48B located above in a horizontal direction.

The operating procedures of the print bonding section 4 will be shown in Figs. 4 to 13.

The first photographic print Pr1 produced by the image forming apparatus 2, as shown in Fig. 4, is delivered to the horizontal conveyor 40A by the delivery roller 40B with the image facing up.

The photographic prints Pr1 delivered to the horizontal conveyor 40A are delivered toward the vertical conveyor 40D in a condition in which the images face upwards, as shown in Fig. 5, and are guided by the guide roller 40F in the direction of the vertical conveyor 40D. Then, as shown in Fig. 6, the photographic prints Pr1 are disposed on and held by the vertical conveyor 40D with the surfaces of the photographic prints Pr1 on which surfaces images have been formed abutting against the surface of the vertical conveyor 40D.

The photographic prints Pr1 held by the conveyor surface of the vertical conveyor 40D, as shown in Fig. 7, are transferred on the vertical conveyor 40D in the direction of the print transfer section 46. Then, in the print transfer section 46, the photographic print Pr1 are held between the main conveyor 46A and the sub-conveyor 46B with the images facing the main conveyor 46A, and the photographic prints P1 are transferred in the direction of the bonding rollers 42.

The second photographic prints Pr2 produced by the image forming apparatus 2 are also delivered by the delivery roller 40B to the horizontal conveyor 40A with the images facing upwards, as in the case of the first photographic prints Pr1.



The photographic prints Pr2 delivered to the horizontal conveyor 40A, as shown in Fig. 8, are delivered in the direction of the vertical conveyor 40C in a condition in which the images face upwards, and are guided by the guide roller 40E in the direction of the vertical conveyor 40C. Then, as shown in Fig. 9, the photographic prints Pr2 are disposed on and held by the vertical conveyor 40C with the surfaces of the photographic prints Pr2 on which surfaces images have been formed abutting against the surface of the vertical conveyor 40C. Then, the photographic prints Pr2, as shown in Fig. 10, are transferred by the vertical conveyor 40C in the direction of the bonding rollers 42. When the photographic prints Pr2 pass in midstream between the gluing roller 44A and the press and transfer roller 44B, glue is applied by the gluing roller 44A to the bottom surfaces of the photographic prints Pr2, that is, the surfaces opposite to the surfaces on which images have been formed. Furthermore, in the bonding rollers 42, the photographic prints Pr2, as shown in Fig. 11, are made to abut against, and are aligned at an end edge thereof with, the first photographic prints Pr1 and are also aligned by the side edge aligning plate 41 at a side edge thereof with the first photographic prints Pr1. Then, as shown in Fig. 12, the bottom surfaces of a photographic print Pr1 and a photographic print Pr2 are bonded together by bonding rollers 42 to form a double-sided sheet PrW. The double-sided sheets PrW thus formed are delivered to the stacking platform 48 and stacked.

The bookbinding section 6, as shown in Fig. 3, is provided with a cutting section 62, a belt mounting section 64, a bookbinding and stacking section 66 and a transfer conveyor 68.

The cutting section 62 is provided so as to be above the double-sided sheet stacking surface 48B when the double-sided sheet stacking surface 48B of the stacking platform 48 is turned to a horizontal position. The cutting section 62 is also provided

with a press plate 62A that presses down, from above, a stack of double-sided sheets put on the double-sided sheet stacking surface 48B; and a cutter 62B that cuts the three end surfaces, of the stack of double-sided sheets put on the double-sided sheet stacking surface 48B, the three end surfaces being end surfaces other than the one end surface aligned by the double-sided sheet receiving surface 48A.

The function of the belt mounting section 64 is to glue a belt to each end surface of a stack of double-sided sheets whose three sides have been cut and aligned by the cutting section 62, and which have been transferred by the transfer conveyor 68. The belt mounting section 64 thereby effects binding of the stack of double-sided sheets.

Hereafter, the operating procedures of the bookbinding section 6 will be described with reference to Figs. 13 to 16.

As shown in Fig. 13, after the stacking on the stacking platform 48 of the double-sided sheets PrW produced by the sheet bonding section 4 has been completed, the stacking platform 48 is turned about 90° upwards, thereby becoming positioned directly below the cutting section 62.

After the stacking platform 48 has been turned about 90° upward, as shown in Fig. 14, the press plate 62A in the cutting section 62 is moved down to press down from above the stack of double-sided sheets PrW, so as to prevent the stack of double-sided sheets PrW from being shifted when they are cut by the cutter 62B. Then, the cutter 62B is moved down to cut along a vertical direction the three end surfaces of the stack of double-sided sheets PrW which end surfaces are not in contact with the stacking platform 48, thus rearranging the three end surfaces (three sides).

The stack of double-sided sheets PrW that have been cut and rearranged up into shape by the cutting section 62, as shown in Fig. 15, are transferred by the transfer belt 68 to the belt mounting section 64. Then, as shown in Fig. 16, a belt is applied by

the belt mounting section 64 on the stack of double-sided sheets PrW and the double-sided sheets PrW are then bound and delivered to the book stacking section 66.

According to the automatic bookbinding system 100 of this embodiment, a photograph collection such as a commemorative album can be made by the image forming apparatus 2 directly from the prints printed on the photographic paper.

Further, the prints produced by the image forming apparatus 2 are bonded together by the print bonding section 4 at bottom edges, that is, based on the side edges of the prints. The double-sided sheets thus produced are stacked on the stacking platform 48 in a condition in which the bottom edges of the double-sided sheets have been aligned. Hence, in the cutting section 62, in order to rearrange the shape of the stack of double-sided sheets, it is recommended that the three end surfaces of the stack of double-sided sheets, which end surfaces are not in contact with the stacking base 48, be cut.

Still further, in the print bonding section 4, glue is applied by the gluing roller 44A to the entire bottom surfaces of the prints, and two prints are thus bonded together over their entire bottom surfaces. Hence, prints can be bonded together firmly, and after bookbinding, the double-sided sheets thus produced are not deformed by differences in shrinkage, between portions in which the bottom surfaces of the prints have been bonded together by glue and the portions in which they have not been bonded together. Nor do any two prints become separated from each other because the portions bonded together with glue have been separated from each other.

As described above, invention provides a print bonding apparatus and an automatic bookbinding apparatus capable of easily book-binding ondemand a photograph collection such as a commemorative album, which needs to be of high quality, and an image forming apparatus appropriately used for supplying photographic

prints to the print bonding apparatus.